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ENGINEERING, INC.

September 9, 2011

Stephen F. Nightingale
Manager, Permit Section
Bureau of Land
Illinois Environmental Protection Agency
1021 North Grand Ave. East
Springfield, IL 62794-9276

Re: 2018080001 – Winnebago County
     Winnebago Landfill
     Permit No. 1991-138-LF
     Addendum 2 to Log No. 2010-373

Dear Mr. Nightingale:

On behalf of Winnebago Landfill, submitted herein are an original and three copies of an addendum to Illinois EPA Log No. 2010-373. The application forms were provided in the original application submitted to the Illinois EPA on August 2, 2010.

The original application provided an alternate source demonstration for confirmed first quarter 2010 exceedences. An additional copy of the narrative portion of the original application was submitted as Addendum No. 1 on September 2, 2010.

As part of the alternate source demonstration, a well-specific intrawell value was proposed for dissolved chromium at southern unit well R22S. As outlined in the alternate source demonstration, R22S is an upgradient well and is not expected to be impacted by the facility. The concentrations of dissolved chromium represent natural fluctuation in the background groundwater quality. In discussions with the Illinois EPA regarding the original submittal, it was suggested that if it can be demonstrated that a change in background groundwater quality has occurred, then the site interwell value should be revised. Given the natural fluctuation of groundwater quality observed in upgradient well R22S, a revised interwell value for dissolved chromium at the southern unit is appropriate. A revised interwell value utilizing eight consecutive quarters of data (third quarter 2009 through second quarter 2011) from the southern unit upgradient wells (R11S, G11D, G13S, G13D, R22S, and R22D) is provided in Attachment A. The statistical method used is provided in Attachment B. The initial proposal to establish a well-specific intrawell value for R22S is withdrawn.
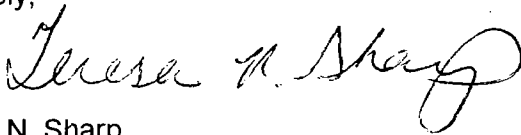
Exceedences of the northern unit interwell value (119.5 mg/l) for dissolved sulfate at upgradient well G13D were also addressed in the original application. Concentrations of dissolved sulfate at G13D have consistently exceeded the interwell value since second quarter 2007. However, at the time the alternate source demonstration was submitted, a decreasing trend was observed. Therefore it was proposed to monitor dissolved sulfate at G13D for an additional four quarters (third quarter 2010 through second quarter 2011) to evaluate whether concentrations would continue to exceed.

Concentrations of dissolved sulfate continued to exceed the AGQS value at G13D during all four quarters. Due to the upgradient location of the well, G13D is not expected to be impacted

by the facility. In addition, the lower concentrations of total sulfate observed in leachate further indicate that the confirmed increases are not associated with the landfill but appear to be related to changes in upgradient groundwater quality (Attachment C). To account for the change in the upgradient background groundwater quality, a revised interwell value for dissolved sulfate at the northern unit is proposed and provided in Attachment A. Eight consecutive quarters of data (third quarter 2009 through second quarter 2011) from the northern unit upgradient wells (G09M, G09D, G13S, G13D, and G20D) was used to derive the revised interwell value. The statistical method used is provided in Attachment B.

Please contact Tom Hilbert at (815) 963-7516 if you have any questions or require additional information.

Sincerely,

Teresa N. Sharp
Environmental Scientist

TNS:bjh:sjb

Enclosure(s)

cc: Tom Hilbert – Rock River Environmental Services
      Bernie Shorle – US EPA Region 5

ATTACHMENT A
Revised Interwell Values

Winnebago Landfill
Southern Unit
Interwell AGQS Statistics

Parameter	Units		3Q09		4Q09		1Q10		G11D 2Q10		3Q10		4Q10		1Q11		2Q11
Chromium, dissolved	ug/l	<	4	<	4	<	4	<	4	<	4	<	4	<	4	<	4

Parameter	Units		3Q09		4Q09		1Q10		R11S 2Q10		3Q10		4Q10		1Q11		2Q11
Chromium, dissolved	ug/l	<	4	<	4	<	4	<	4	<	4	<	4	<	4	<	4

Parameter	Units	3Q09	4Q09		1Q10	G13D 2Q10	3Q10	4Q10	1Q11	2Q11
Chromium, dissolved	ug/l	16	12	<	4	72	70	42	29	11

Parameter	Units	3Q09		4Q09		1Q10		G13S 2Q10	3Q10	4Q10	1Q11	2Q11
Chromium, dissolved	ug/l	4.7	<	4	<	4	<	4	5.3	4.2	4.2	8.2

Parameter	Units	3Q09	4Q09	1Q10	G22D 2Q10	3Q10	4Q10	1Q11	2Q11
Chromium, dissolved	ug/l	15	18	8.8	9.3	15	16	16	26

Parameter	Units	3Q09	4Q09	1Q10	R22S 2Q10	3Q10	4Q10	1Q11	2Q11
Chromium, dissolved	ug/l	24	26	24	20	36	24	25	36

Normal Distribution*	Nonparametric Upper Prediction Limit**
no	72

Notes:
*Shapiro-Wilk utilized to test for normality
**The maximum value was utilized as the nonparametric upper prediction limit

Winnebago Landfill
Northern Unit
Interwell AGQS Statistics

Parameter	Units	G09M 3Q09		4Q09		1Q10		2Q10		3Q10		4Q10		1Q11		2Q11
Sulfate, dissolved	mg/l	<	1	<	1	46	<	1	<	1	<	1	<	1	<	1

Parameter	Units	G09D 3Q09	4Q09		1Q10	2Q10	3Q10	4Q10	1Q11	2Q11
Sulfate, dissolved	mg/l	46	49	<	1	43	52	46	42	40

Parameter	Units	G13S 3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11
Sulfate, dissolved	mg/l	140	160	110	120	20	97	190	160

Parameter	Units	G13D 3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11
Sulfate, dissolved	mg/l	70	280	310	270	360	260	190	280

Parameter	Units	G20D 3Q09	4Q09	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11
Sulfate, dissolved	mg/l	19	22	18	19	18	31	20	20

Normal Distribution*	Nonparametric Upper Prediction Limit**
no	360

Notes:
*Shapiro-Wilk utilized to test for normality
**The maximum value was utilized as the nonparametric upper prediction limit

ATTACHMENT B

Statistical Method

Statistical Analyses Method

References:

1. 35 Illinois Administrative Code 811.320
2. Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Unified Guidance, USEPA, March 2009

Background quality shall be determined using the statistical techniques set forth in 35 IAC 811.320(e) and the facility permit. The data was tested for normality using the Shapiro-Wilk normality test. If the data was found not to follow a normal distribution, a nonparametric statistical method was utilized. The data was then examined for outliers. After the outlier test, the percentages of non-detect values (NDs) were calculated for each parameter to determine the applicable ND treatment method, if any. Upon completion of the treatment of non-detect values, the prediction limit for each parameter was calculated using the mean, standard deviation, and the appropriate t value. The statistical analysis uses a one-tailed test to determine an upper limit of significance. The upper prediction limit is the concentration for the probability that the constituent can be measured without constituting a statistical increase above the background. Any concentration found below this limit is regarded as falling within the normal statistical population.

Statistical Method

The statistical method employs either the 99% or 95% prediction limit in accordance with the facility permit. The prediction limit incorporates the mean, standard deviation, number of samples, and the Student's t value in the calculation to determine general background groundwater quality. An upper prediction limit is calculated for each individual chemical parameter. The well data from the site is evaluated statistically with samples collected during a minimum of four (4) consecutive quarters of background sampling.

Handling of Outliers

Prior to statistical analyses the data set was evaluated for outliers. Outliers are defined as data points that vary significantly from the mean value for that data set. Outliers may represent sampling error, contamination from surface run-off, analytical laboratory error, or anomalous site conditions. Outliers, if not removed from the data set, can erroneously

increase the AGQS and minimize the occurrence of an exceedences related to a release from a waste unit. Once a statistical outlier has been identified, the concentrations are evaluated to determine the cause. If a valid reason has been determined for the outlier, the data point will be removed from the data set. If no specific reason can be documented, the point will considered representative and included in the analysis. Statistical analysis will then be conducted as described below.

Handling of Non-Detects (NDs)

Non-detect values (NDs) were handled according to the percentage of Non-Detects (%ND) present in the background sampling. The %ND was calculated for each parameter from the pooled background data of each well set. The data treatment was done according to the following criteria:

a) For under 0% NDs, no adjustment is made to the values in the data set.

b) For under 15% NDs, the value of one-half (½) the reported Detection Limit (DL) was substituted for the ND value, and the mean and standard deviation were calculated using detected values with the substituted ND values.

c) For 15-50% NDs, Cohen's Adjustment was used to adjust the mean and standard deviation. The adjusted mean and standard deviation was then used to calculate the prediction limit.

d) For over 50% but not 100% NDs, the highest recorded concentration was substituted for the prediction limit.

e) For 100% NDs, the Practical Quantitation Limit (PQL) will be substituted for the ND value. The mean and standard deviation was calculated using the substituted ND values.

Prediction Limit

The statistical procedure was conducted according to the following steps:

1.   Calculate arithmetic mean

The arithmetic mean was calculated using the pooled data for each parameter. The arithmetic mean (X_b) was calculated using the following equation:

$$X_b = \frac{X_1 + X_2 + ... + X_n}{n}$$

where: X_b = Average background value

X_n = Individual background value for *n* sample

n = Number of background values

2. Calculate standard deviation

The standard deviation was calculated using the pooled data for each parameter. The standard deviation was calculated using the following equation:

$$S_b = \sqrt{\frac{(X_1 - X_b) + (X_2 - X_b) + ... + (X_n - X_b)}{n-1}}$$

where: S_b = Population standard deviation
X_n = Individual background value for *n* sample
X_b = Mean (1)
n = Number of background samples

3. Calculate the Upper Prediction Limit

The Upper Prediction Limit was calculated for each parameter using the mean (1), the standard deviation (2), the number of background samples, and the Student's t value. The Student's t value σ, is determined by the facility permit whether it is σ = 0.01 (99% Confidence) or σ = 0.05 (95% Confidence). The Student's t value also varies upon the number of background samples utilized in the calculations. For those parameters with 15% to 50%% NDs, the Cohen Method was utilized to calculate the Prediction Limit. The methodology described in "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Unified Guidance" was used to calculate the Cohen Prediction Limit. The Upper Prediction Limit for the remaining parameters was calculated using the following equation:

$$PL = X_b +\!\!\!-\ S_b \bullet t \bullet \sqrt{1 + \frac{1}{n}}$$
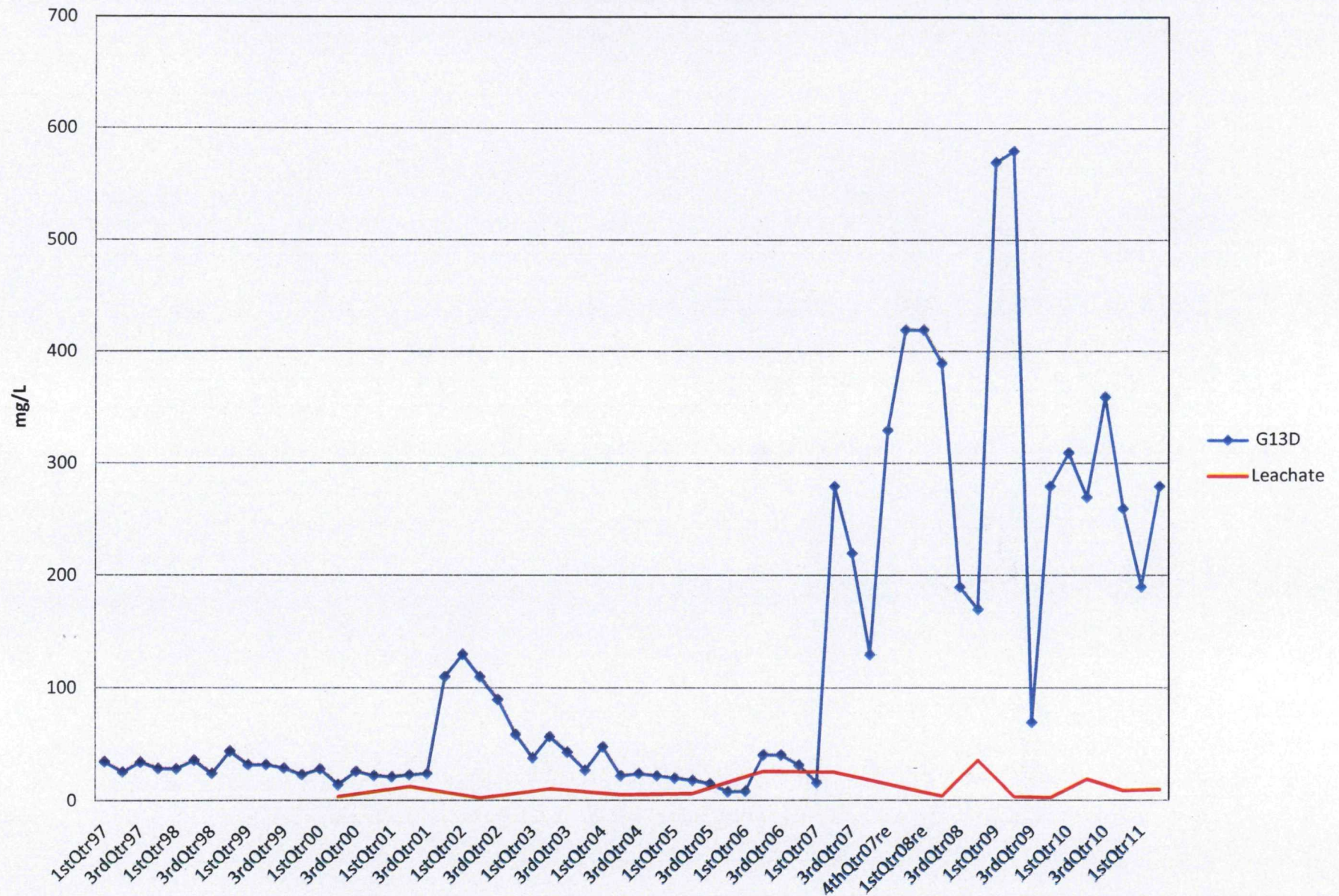
where: PL = Upper Prediction Limit (Upper and Lower for pH)
X_b = Mean (1)
S_b = Standard Deviation (2)
t = Student's t value at 0.01 or 0.05 significance
n = Number of background samples

Andrews Engineering, Inc.

ATTACHMENT C
Dissolved Sulfate Trend Graph

Winnebago Landfill
Northern Unit
Dissolved Sulfate

J:\1990\90-114\MON\Sig Mods\1Q10 ASD\Addendum 2 Table and Graph

Sulfate, d

ANDREWS
ENGINEERING, INC.

Corporate Headquarters
Springfield Branch Office
3300 Ginger Creek Drive
Springfield, IL 62711
Tel: (217) 787-2334
Fax: (217) 787-9495
marketing@andrews-eng.com

Pontiac Branch Office
215 West Washington Street
Pontiac, IL 61764
Tel: (815) 842-2042
Fax: (815) 842-2159
pont@andrews-eng.com

Indianapolis Branch Office
7172 Graham Road, Suite 125
Indianapolis, IN 46250
Tel: (317) 595-6492
Fax: (317) 598-9929
indy@andrews-eng.com

Naperville Branch Office
1701 Quincy Avenue, Suite 25
Naperville, IL 60540
Tel: (630) 544-3332
Fax: (630) 544-3398
naperville@andrews-eng.com

St. Louis Branch Office
131 W. Booneslick Road
Warrenton, MO 63383
Tel: (636) 456-6387
Fax: (636) 456-6389
stl@andrews-eng.com